STANDARDIZED INTERIM PROGRESS REPORT

A. Project Identifiers:

1) Award Number: NA17FX1430

2) Grant Program / CFDA: 11.439

3) Name of Recipient Organization: Texas A&M Research Foundation

4) Principal Investigator: Markus Horning

5) Project Title:
Installation of a Remote Census and Photogrammetry Network: Validation and Assessment of Seasonal & Individual Steller Sea Lion Body Condition and Population Trends.

6) Funding: Federal: $966,139 Match: $ 17,900

7) Award Period: June 1st, 2001 through May 31st, 2004

8) Period Covered by this Report: June 1st, 2001 through November 30th, 2001

B. Project Summary:

The Gulf of Alaska, Aleutian Islands and Bering Sea regions comprise delicate ecosystems threatened by profound regime shifts, and represent one of the biologically and economically most important ecosystems in the United States, providing over fifty percent of fish and shellfish catches in a multi-billion dollar industry. Steller sea lions as one of the apex predator species in this region have declined to about fifteen percent of peak population levels and are currently listed as endangered in the western portion of their range, along the Aleutian Islands and in the Bering Sea. Other species have exhibited less dramatic but nonetheless severe declines. Extensive removal of fish biomass through commercial trawling has been hypothesized as one possible factor involved in the decline of Aleutian and Bering Sea pinnipeds. However, no conclusive data exists to shed light on the hypothesized link between commercial fisheries, nutritional stress and reduced reproductive output of pinnipeds, or to allow for analysis of proximate mechanisms linking hypothesized cause and effect.

Significant fisheries management decisions are being made under dearth of adequate data. This lack of vital data encompasses some of the most basic life-history information: 1) Year-round population census figures of sufficient spatial and temporal resolution, including details on the age structures of populations. 2) Body mass and body condition estimates, both in form of longitudinal data from individual animals as well as cross-sectional data for meta populations. 3) Year-round detailed foraging behavior data of sufficient temporal and spatial resolution to accurately assess fisheries interactions.

Several reasons can be listed for this lack of conclusive data: The species of interest reside in very remote and inaccessible locations in predominantly extreme environments. They include some of the most difficult marine mammal and seabird species to work with, partly on account of their extreme shyness and sensitivity to disturbances. Rookeries and haulouts are difficult to approach, let alone land on, frequently impossible on a repeated basis. Most observations have been limited to the reproductive season during local summer.

Under NMFS - SSLRI funding, we are developing and validating the photogrammetric, remote estimation of body mass and condition of Steller sea lions, using animals held at the Alaska Sea Life Center. Our approach uses three-dimensional photogrammetry based on multiple time-synchronous digital still images from disparate perspectives to obtain accurate spatial measurements, in a novel process recently validated by our laboratory.

We will build and install two remote, Satellite Linked Data Acquisition and Photogrammetry systems (SLIDAP systems), at locations along the Aleutian Islands. The SLiDAP system is currently under development in our lab under NSF funding. The system will consist of remotely accessible (via satellite data link) self-contained digital still imaging stations linked via wireless LAN to into a remote, close range photogrammetric imaging network. We will use the two new SLIDAP systems, in conjunction with two more systems to be built under NSF funding, to collect detailed, year-round census data. We will estimate by three-dimensional photogrammetry, body mass and condition trends at monitoring locations, both cross-sectional and longitudinal, and throughout the year.

This will ultimately allow us to compare seasonal, annual and supra-annual body mass and condition trends to the occurrence of fishing episodes and to levels of biomass removal, and will allow us to assess sensitive periods in the life history of Steller sea lions.

C. Summary of Progress and Results:

Non-scheduled activities:

A permit to conduct the proposed research under the MMPA / ESA has been applied for under the leadership of the Alaska Sea Life Center (ASLC). This permit is currently in review. The sampling being presently conducted (see below) is permitted under the existing sampling / health assessment permit of the ASLC.

Tasks scheduled for the reporting period:

The sole task scheduled for this reporting period was Task 1: the preparation of the physiological studies to be conducted at the Alaska Sea Life Center (ASLC). This task is scheduled to continue through Month 10 of the project, and is progressing well. We have completed the purchases of all required equipment, in particular the Sonosite portable ultrasound imaging system. This system was delivered to us at the ASLC, and on-site training was provided by the vendor. On the three resident Steller sea lions held at the ASLC, routine ultrasound scans for the determination of blubber thickness were performed and are continuing. Routine blood samples were collected and analyzed for standard hematology and clinical chemistry parameters. Photogrammetric measurements and analyses on the three resident Stellers at the ASLC have been performed and are continuing. Evaluation of all data collected so far will continue, and we do not have any results to report at this stage.

Related activities:

Even though the following tasks are not part of this NMFS - SSLRI grant, they are relevant to the success of this grant and we will therefore provide a brief report:

The development of the SLiDAP imaging system under NSF sponsorship is progressing. Major system components have been purchased and are being evaluated and tested. We are also evaluating further systems components not yet purchased, to determine whether newer technology than what was originally proposed (satellite data links, wireless LAN etc..) can be used to increase system performance. Under the NSF grant, a subcontract has been initiated with EOS Inc. (Vancouver, BC, Canada), for the adaptation of their existing 3D photogrammetry software package specifically for the purpose of facilitating 3D-based remote Steller sea lion census operations. Test images of Steller sea lions for the continued development of this software were kindly collected by researchers of the National Marine Mammal Lab (NMFS) on a recent NMFS research cruise.

The novel concept of 3D-photogrammetric body mass estimation pioneered in our lab was presented by former LABB masters student Jason Waite at the 2001 Marine Mammal Conference at Vancouver, BC, Canada, where Mr. Waite received 2nd prize in the Fairfield Memorial Award Innovative Research competition for this research.

D. Problems:

We experienced some delays in certain activites due to two events: 1) the Laboratory for Applied Biotelemetry & Biotechnology at Texas A&M University has relocated to a new location (a new building adjacent to the previous location). 2) Dr. Jo-Ann Mellish, co-Principal Investigator on this grant, has relocated to the Alaska Sea Life Center, where she has accepted a position as marine mammal scientist. This will actually benefit our project in that Dr. Mellish will be able to directly conduct and supervise all activities scheduled to occur at the ASLC. Overall, we are on schedule with our work on the SSLRI grant, and there are no consequences resulting from these events at this stage. The NSF-sponsored SLiDAP imaging station development is however running slightly behind schedule, due to event 1) listed above. We are accelerating our efforts and hiring additional personnel to catch up. We are hoping to recover lost time on the SLiDAP development by this coming summer, and at this stage we do not foresee the delayed SLiDAP development creating any complications for this SSLRI project.